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GIS AND MINING CLAIMS RECORDS

(Creating a mining claim density map)

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GIS AND MINING CLAIMS RECORDS

ACKNOWLEDGEMENTS

The methodology for using mining claims data in a GIS environment is based on the Fortran programs and documentation developed by David Plume, geologist, and JoAnn Stroh of the Vernal District Office (DO). These original Fortran programs only worked for Utah data. David Roybal, Computer Specialist, at the Bureau of Land Management's (BLM) Service Center (SC), enhanced the Fortran programs. The programs can now be used by any BLM office that has mining claims data.

For more information on Plume's original programs and how he used those for GIS applications, see *Mining Claim Distribution Mapping Utilizing Legal Land Description as a Link to MOSS*, which is in the proceedings for the 1990 MOSS Conference.

OVERVIEW

This user manual shows you how to use programs that extract the types and status of mining claims from the Mining Claims Recordation database and reformat the extracted data into an attribute file that matches a given landlines map. This attribute file can then be added as multiple attributes to the landlines map. The map can then be used for map analyses, such as showing the distribution and density of the mining claims for sections within a township or a quadrangle map. You can use this map for managing mineral resources and for resource management planning.

The mining claims records do not provide exact geographic locations for the claims. However, they do contain public land survey data (i.e., meridian, township, range and section). These data can be used as a link to the same data in a MOSS public land survey map (polygons).

The program **MC2MOSS.RUN** extracts township data and counts the number of open and closed claims for each section in your state. Each line (record) in the output file contains the following information:

- Township, Range and Section
- Number of following claims:
  - open lode; open placer; open mill; open tunnel
  - total open claims
  - closed lode; closed placer; closed mill; closed tunnel
  - total closed claims
  - total open and closed claims
- Whole or Partial (WHL or PART)

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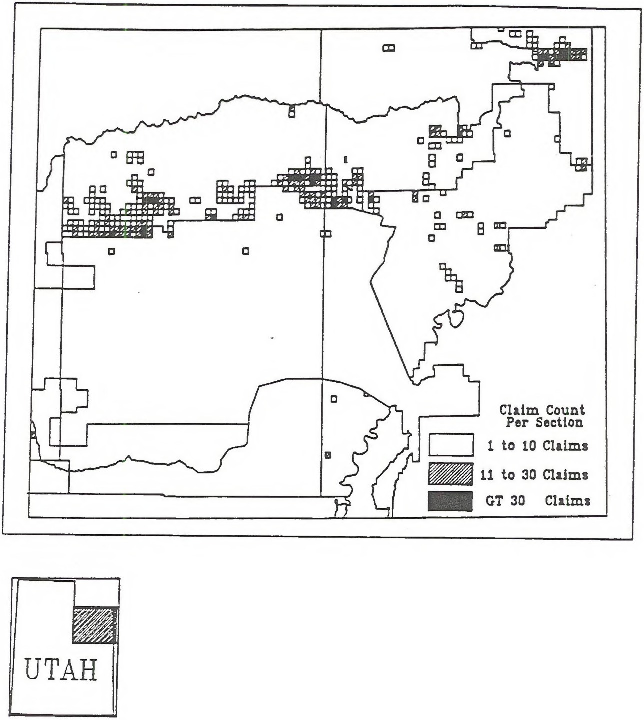
A second program, **GETPOLY.RUN**, uses the output data file from **MC2MOSS.RUN** and a MOSS public land survey map. It creates a data file of the above information for only those sections (polygons) found in the map. The subjects in the data file are in the same order as the items in the MOSS map; thus resequencing the file before adding the attributes to the MOSS map is not necessary. You can add the attributes to the map using the MOSS command **UTILITY--ADD ATTRIBUTES** and the definition file named **MC.DEF**.

After the attributes are added to the MOSS public land survey map, you can generate claim density maps by assigning shading patterns to various groupings of density. Figure 1 is taken from Plume's paper and illustrates the resultant map for the Vernal DO.

The rest of this manual will provide you with step-by-step instructions on how to run the programs and create a density map.

FIGURE 1. Load mining claim distribution map, Northeastern Utah.*



* Taken from David Plume's article: Mining Claim Distribution Mapping Utilizing Legal Land Description as a Link to MOSS, Moss Conference, 1990.

METHODOLOGY (Step-by-Step)

See Figure 2 for a diagram of the process to extract specific data from mining claims data and attach the data as attributes to a MOSS map. The steps taken in this process are as follows:

1. Check that the following programs are loaded into your PRIME computer:

    MC2MOSS.RUN
    GETPOLY.RUN
    MC.DEF

2. Request the mining claims data for your state from the SC-322. Have the data downloaded to a 9-track magnetic tape(s) with the following parameters:

    Ascii
    6200 BPI
    Record length 84
    Block 4200

3. Instruct your system operator to upload the mining claims data from the tape into your user directory on the PRIME. The operator needs to know the following:

    UTILITY: MAGNET
    BFACTOR: 1
    RECORD LENGTH: 84
    NO. of FILES: 1 or more
    FILE TYPE: ASCII
    DENSITY: 9-track, 6200 BPI, Block 4200
    PATHNAME (for output): [your directory pathname]

4. If there are more than one magnetic data tapes, repeat Step 3. Then concatenate the tape files in your directory using the PRIMOS command **CONCAT** with the option -nheader, which suppresses headers or banners. When you type **CONCAT**, the system gives you a colon prompt (:). It asks if it is alright to modify the first tape file and if you want to overwrite or append. Then it asks you for the filenames, one at a time, that you want to append. When you have listed all the files you want appended, enter a carriage return to end the append. The system will then go into COMMAND mode with a different prompt. Reply with Q or q (for quit) to return to PRIMOS command level.

Example:

```
OK, CONCAT TAPEFILE.1 -NHEADER
OK to modify old tapefile.1:   YES
Overwrite or Append:   A
Enter filenames, one per line:
: TAPEFILE.2
: TAPEFILE.3
: <CR>
> Q
OK,
```

5. Run the program **MC2MOSS.RUN**.

This program will ask for the meridian (integer) of your study area, the name of mining claims file, and the name you want to call the output file.

> **NOTE:** If you have more than one meridian to work with, you will have to run the program again for each meridian.
>
> **NOTE:** After you type in "R MC2MOSS", it may take over two minutes for the program to create the arrays. Wait until you receive the first prompt for the input file.

Here is an example of a mining claims record:

```
09000003919010384401   HYDRO-JET MS #1     C0310197712281976481082019801980    1 000
0900000391902026N2   0350S0110E021UT017               057800                     000
09000003919100HYDRO-JET SERVICES  PO BOX 808          AMARILLO       TX79105     000
0900000391920063105011984                    50103101977UMC3919                  000
0900000391920150003101977UMC3919             40401261977160256;233;114           000
```

In this example, the program extracts:

From line 1: the serial number (000003919), record type (010), claim type (44) and status (C)

From line 2: the meridian (26) and the township, range and section (0350S0110E021).

Figure 3 is a listing of an example run of the **MC2MOSS.RUN** program. Figure 4 shows a partial listing of the generated data file. Figure 5 is a listing of the record format for the data file. Note that south township and west range are negative numbers.

6. After you have completed Step 5, you may want to delete all the tape files from your directory as these data are no longer needed and require too much disk space to keep.

7. Run the program **GETPOLY.RUN**.

This program reads the data from the file that was created by the program **MC2MOSS.RUN**. It accepts a MOSS Public Land Survey map (polygon) from your state as a template and selects data only for those geographic locations found in the MOSS map. This subset of data is then written to an attribute file. The attribute file is already sequenced and ready to be added to the MOSS map. Run the **GETPOLY.RUN** program for each public land survey map you wish to analyze.

> **NOTE:** The program assumes the format for the subject of MOSS map is the same as the following example:
>
> 001; T0290S.R0200E
>
> where, in this example,
> 001 is Section 1
> T0290S is Township 29 South
> R0200E is Range 20 East

Figure 6 is a listing of an example run of the **GETPOLY.RUN** program and Figure 7 shows a partial listing of the generated attribute file. Figure 8 is a listing of the record format for the data file.

8. Add the attributes to the MOSS map using the **UTILITY - ADD ATTRIBUTE** command and the definition file named **MC.DEF**. Figure 9 is a listing of the attributes after they are attached to the MOSS map.

FIGURE 2. Diagram of the "Mining Claim Information to MOSS Map Attribute" Process.

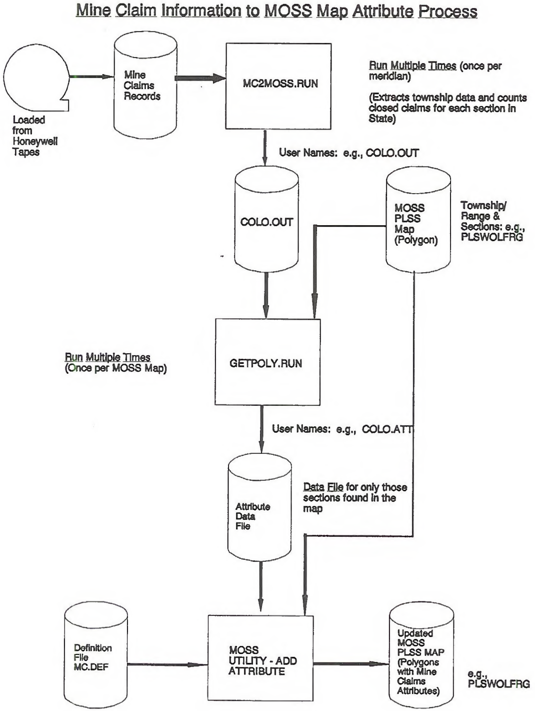

Mine Claim Information to MOSS Map Attribute Process
Loaded from Honeywell Tapes
Mine Claims Records
MC2MOSS.RUN
Run Multiple Times (once per meridian)
(Extracts township data and counts closed claims for each section in State)
User Names: e.g., COLO.OUT
COLO.OUT
MOSS PLSS Map (Polygon)
Township/ Range & Sections: e.g., PLSWOLFRG
Run Multiple Times (Once per MOSS Map)
GETPOLY.RUN
User Names: e.g., COLO.ATT
Attribute Data File
Data File for only those sections found in the map
Definition File MC.DEF
MOSS UTILITY - ADD ATTRIBUTE
Updated MOSS PLSS MAP (Polygons with Mine Claims Attributes)
e.g., PLSWOLFRG

FIGURE 3. Listing of an example run of the MC2MOSS.RUN program.

```
OK, R MC2MOSS

 Enter name of <Input> data file.
 (Must be sequential.)
 Enter <STOP> to quit.

TAPEFILE

 Enter name of <Ouput> data file.
 Enter <STOP> to quit.
MC2MOSS.OUT
 Enter Meridian (1-48) :
26
 You have chosen meridian:          26
 Is this correct? [Enter <Yes/No>  CR=Yes]
Y

 Initializing Complete.
 Now reading your input file...Please wait.

 End of input data file reached.
 Begin writing to output data file.
 The total number of mining claims read =        244,638
 Minimum and Maximum Township Values    =        -44          15
 Minimum and Maximum Range Values       =        -20          26

 Processing whole township data.
 Now processing partial townships and ranges.

 **************************************
 * The Total Number of Header         *
 * Records Read was:        244,638
 *                                    *
 **************************************

 **************************************
 * The Total Number of <BAD> Header   *
 * Records Read was:             0
 *                                    *
 **************************************

 **************************************
 * The Total failed records for any   *
 * reason:             0
 *                                    *
 **************************************
 End Run...
**** STOP
OK,
```

FIGURE 4. Partial listing of the data file generated by the MC2MOSS.RUN program. Note that south township is a negative number.

```
-34  11   1       0    0    0    0    0   16    0    0    0   16   16 WHL
-34  11   6       0    0    0    0    0   33    0    0    0   33   33 WHL
-34  11   7       0    0    0    0    0   52    0    0    0   52   52 WHL
-34  11   8       0    0    0    0    0    4    0    0    0    4    4 WHL
-34  11   9       0    0    0    0    0    1    0    0    0    1    1 WHL
-34  11  10       0    0    0    0    0    4    0    0    0    4    4 WHL
-34  11  11       0    0    0    0    0    3    0    0    0    3    3 WHL
-34  11  12       0    0    0    0    0   55    0    0    0   55   55 WHL
-34  11  13       0    0    0    0    0   43    0    0    0   43   43 WHL
-34  11  14       0    0    0    0    0   38    0    0    0   38   38 WHL
-34  11  15       3    0    0    0    3   60    0    0    0   60   63 WHL
-34  11  16       6    0    0    0    6   14    0    0    0   14   20 WHL
-34  11  17       5    0    0    0    5   56    0    0    0   56   61 WHL
-34  11  18       0    0    0    0    0   59    0    0    0   59   59 WHL
-34  11  19      11    0    0    0   11   75    0    0    0   75   86 WHL
-34  11  20      53    1    0    0   54   18    1    0    0   19   73 WHL
-34  11  21      47    1    0    0   48    3    1    0    0    4   52 WHL
-34  11  22      53    0    0    0   53    7    0    0    0    7   60 WHL
-34  11  23      41    0    0    0   41    5    0    0    0    5   46 WHL
-34  11  24      11    0    0    0   11   38    0    0    0   38   49 WHL
-34  11  25      25    0    0    0   25   22    0    0    0   22   47 WHL
-34  11  26      52    0    0    0   52    0    0-   0    0    0   52 WHL
-34  11  27      55    0    0    0   55    1    0    0    0    1   56 WHL
-34  11  28      47    3    0    0   50    1    1    0    0    2   52 WHL
-34  11  29      53    2    0    0   55   18    2    0    0   20   75 WHL
-34  11  30      12    0    0    0   12   74    0    0    0   74   86 WHL
-34  11  31       2    3    0    0    5   37    3    0    0   40   45 WHL
-34  11  32      13    0    0    0   13   10    0    0    0   10   23 WHL
-34  11  33      45    3    0    0   48    1    1    0    0    2   50 WHL
-34  11  34      49    0    0    0   49    9    0    0    0    9   58 WHL
-34  11  35      24    0    0    0   24   20    0    0    0   20   44 WHL
-34  11  36       4    0    0    0    4    0    0    0    0    0    4 WHL
```

FIGURE 5. Record format for the data file generated by MC2MOSS.RUN.

COLUMN	DESCRIPTION
1 - 4	Township (South is negative)
5 - 8	Range (West is negative)
10 - 11	Section
17 - 20	Number of Open Lode claims
21 - 24	Number of Open Placer claims
25 - 28	Number of Open Millsite claims
29 - 32	Number of Open Tunnel claims
33 - 36	Total Open claims
37 - 40	Number of Closed Lode claims
41 - 44	Number of Close Placer claims
45 - 48	Number of Closed Millsite claims
49 - 52	Number of Closed Tunnel claims
53 - 56	Total Closed claims
57 - 60	Total claims
61 - 65	Whole (WHL) or Partial (PART)

FIGURE 6. Listing of an example run of the GETPOLY.RUN program.

```
OK, R GETPOLY

 Enter the name of the <MOSSMAP>, or
  <STOP> to terminate.
UTAH_T34.LAP

 Enter the name of the <MINECLAIM COUNTS> file.
MC2MOSS.OUT

 Enter the name of the <OUTPUT> data file.
UTAH_34.DAT


 ************************************************

             User Input Summary

          MOSSFILE = UTAH_T34.LAP
  CLAIM COUNT FILE = MC2MOSS.OUT
       OUTPUT FILE = UTAH_34.DAT

             Is this ok with you?
   Enter NO to re-enter file and project names

 ************************************************
Y

 *****************************************
 Map:              UTAH_T34.LAP
 Map Description:
           LANDLINES
 Study Area      :
 The number of <ITEMS> is:        72
 *****************************************

 Is this OK? <y/n>
Y

 Initializing State Array.... Please Wait

 Initializing Partial Townships Array.... Please Wait

 Initializing Complete.

 EOF on input of countfile.

 Program completed.

 **************************************************
 Use MOSS attribute utilities to add attributes to:
               <<UTAH_T34.LAP>>

 Use the data file created by this program as a
 data file during attribution. Its name is:
               <<UTAH_34.DAT>>

 This file does <NOT> need to be resequenced.

 **************************************************

 End Program
**** STOP

OK,
```

FIGURE 7. Partial listing of the attribute file generated by the GETPOLY.RUN program.

```
001; T0340S.R0110E     0    0    0    0    0   16    0    0    0   16   16
002; T0340S.R0110E     0    0    0    0    0    0    0    0    0    0    0
003; T0340S.R0110E     0    0    0    0    0    0    0    0    0    0    0
004; T0340S.R0110E     0    0    0    0    0    0    0    0    0    0    0
005; T0340S.R0110E     0    0    0    0    0    0    0    0    0    0    0
006; T0340S.R0110E     0    0    0    0    0   33    0    0    0   33   33
007; T0340S.R0110E     0    0    0    0    0   52    0    0    0   52   52
008; T0340S.R0110E     0    0    0    0    0    4    0    0    0    4    4
009; T0340S.R0110E     0    0    0    0    0    1    0    0    0    1    1
010; T0340S.R0110E     0    0    0    0    0    4    0    0    0    4    4
011; T0340S.R0110E     0    0    0    0    0    3    0    0    0    3    3
012; T0340S.R0110E     0    0    0    0    0   55    0    0    0   55   55
013; T0340S.R0110E     0    0    0    0    0   43    0    0    0   43   43
014; T0340S.R0110E     0    0    0    0    0   38    0    0    0   38   38
015; T0340S.R0110E     3    0    0    0    3   60    0    0    0   60   63
016; T0340S.R0110E     6    0    0    0    6   14    0    0    0   14   20
017; T0340S.R0110E     5    0    0    0    5   56    0    0    0   56   61
018; T0340S.R0110E     0    0    0    0    0   59    0    0    0   59   59
019; T0340S.R0110E    11    0    0    0   11   75    0    0    0   75   86
020; T0340S.R0110E    53    1    0    0   54   18    1    0    0   19   73
021; T0340S.R0110E    47    1    0    0   48    3    1    0    0    4   52
022; T0340S.R0110E    53    0    0    0   53    7    0    0    0    7   60
023; T0340S.R0110E    41    0    0    0   41    5    0    0    0    5   46
024; T0340S.R0110E    11    0    0    0   11   38    0    0    0   38   49
025; T0340S.R0110E    25    0    0    0   25   22    0    0    0   22   47
026; T0340S.R0110E    52    0    0    0   52    0    0    0    0    0   52
027; T0340S.R0110E    55    0    0    0   55    1    0    0    0    1   56
028; T0340S.R0110E    47    3    0    0   50    1    1    0    0    2   52
029; T0340S.R0110E    53    2    0    0   55   18    2    0    0   20   75
030; T0340S.R0110E    12    0    0    0   12   74    0    0    0   74   86
031; T0340S.R0110E     2    3    0    0    5   37    3    0    0   40   45
032; T0340S.R0110E    13    0    0    0   13   10    0    0    0   10   23
033; T0340S.R0110E    45    3    0    0   48    1    1    0    0    2   50
034; T0340S.R0110E    49    0    0    0   49    9    0    0    0    9   58
035; T0340S.R0110E    24    0    0    0   24   20    0    0    0   20   44
036; T0340S.R0110E     4    0    0    0    4    0    0    0    0    0    4
```

FIGURE 8. Record format for the data file generated by the GETPOLY.RUN program.

```
COLUMN          DESCRIPTION
=========================================================================

 2 -  3         Section
 6 - 18         Township and Range
24 - 25         Number of Open Lode claims
29 - 30         Number of Open Placer claims
34 - 35         Number of Open Millsite claims
39 - 40         Number of Open Tunnel claims
44 - 46         Total Open claims
49 - 50         Number of Closed Lode claims
54 - 55         Number of Close Placer claims
59 - 60         Number of Closed Millsite claims
64 - 65         Number of Closed Tunnel claims
69 - 70         Total Closed claims
74 - 76         Total claims (open and closed)
```

FIGURE 9. Listing of the attributes after they are attached to the MOSS map.

```
DESC UTAH_T34.LAP AT
 PLEASE ENTER OPTION:
  1 = TERMINATE ATTRIBUTE BROWZE   [DEFAULT]
  2 = LIST INDIVIDUAL ATTRIBUTE BY KEY NAME
  3 = LIST INDIVIDUAL ATTRIBUTE BY ID NUMBER
  4 = LIST ATTRIBUTE HEADER INFORMATION

: 4
 -------------------------------------------------------------
 IDTY---KEY-------DESCRIPTOR-------------------------------------
  1 IN SECTION SECTION NUMBER
  2 CH TWPRNG TOWNSHIP AND RANGE
  3 IN OLODE NUMBER OF OPEN LODE CLAIMS
  4 IN OPLACER NUMBER OF OPEN PLACER CLAIMS
  5 IN OMILL NUMBER OF OPEN MILL CLAIMS
  6 IN OTUNNEL NUMBER OF OPEN TUNNEL CLAIMS
  7 IN OTOTAL TOTAL NUMBER OF OPEN CLAIMS
  8 IN CLODE NUMBER OF CLOSED LODE CLAIMS
  9 IN CPLACER NUMBER OF CLOSED PLACER CLAIMS
 10 IN CMILL NUMBER OF CLOSED MILL CLAIMS
 11 IN CTUNNEL NUMBER OF CLOSED TUNNEL CLAIMS
 12 IN CTOTAL TOTAL NUMBER OF CLOSED CLAIMS
 13 IN TOTAL TOTAL CLOSED AND OPEN CLAIMS
 -------------------------------------------------------------
 PLEASE ENTER OPTION:
  1 = TERMINATE ATTRIBUTE BROWZE   [DEFAULT]
  2 = LIST INDIVIDUAL ATTRIBUTE BY KEY NAME
  3 = LIST INDIVIDUAL ATTRIBUTE BY ID NUMBER
  4 = LIST ATTRIBUTE HEADER INFORMATION

: 1
ENTER COMMAND ?
BYE
```

GENERATING A MINING CLAIMS DENSITY MAP

The number of mining claims may now be selected and grouped using the **BSEARCH** command.

Example of groupings for open lode claims:

```
BSEARCH mossmap
Enter logical expression:
OLODE GT 0 AND OLODE LT 11

BSEARCH mossmap
Enter logical expression:
OLODE GT 10 AND OLODE LT 21

BSEARCH mossmap
Enter logical expression:
OLODE GT 20 AND OLODE LT 31

BSEARCH mossmap
Enter logical expression:
OLODE GT 30 AND OLODE LT 41

BSEARCH mossmap
Enter logical expression:
OLODE GT 40
```

This will put 5 groupings of open lode mining claims per section in your active table. You can now plot them on the screen, using **SHADE** or **FLOOD**. Or you can prepare a metafile for the plotter using the **PENPLOT** command.

Figure 10 shows a township with open mining claims, and Figure 11 shows a township with open placer claims.

FIGURE 10. Township 34, Range 11: Open mining claims.

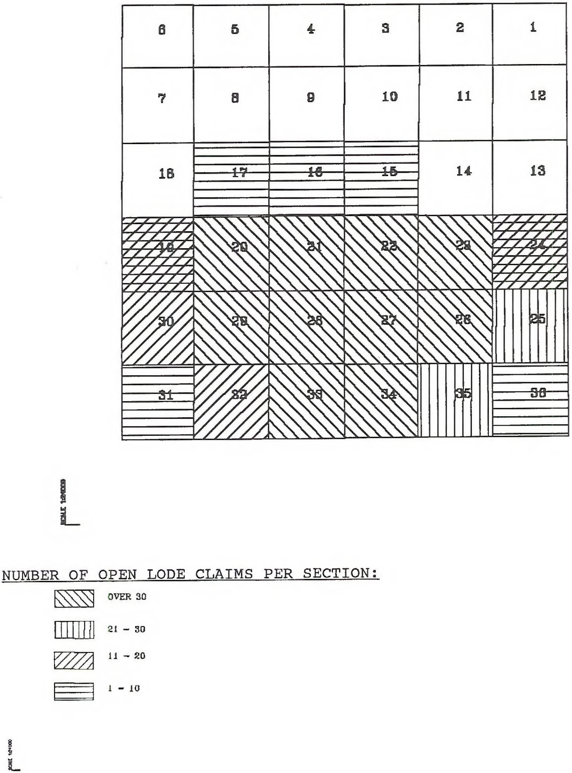
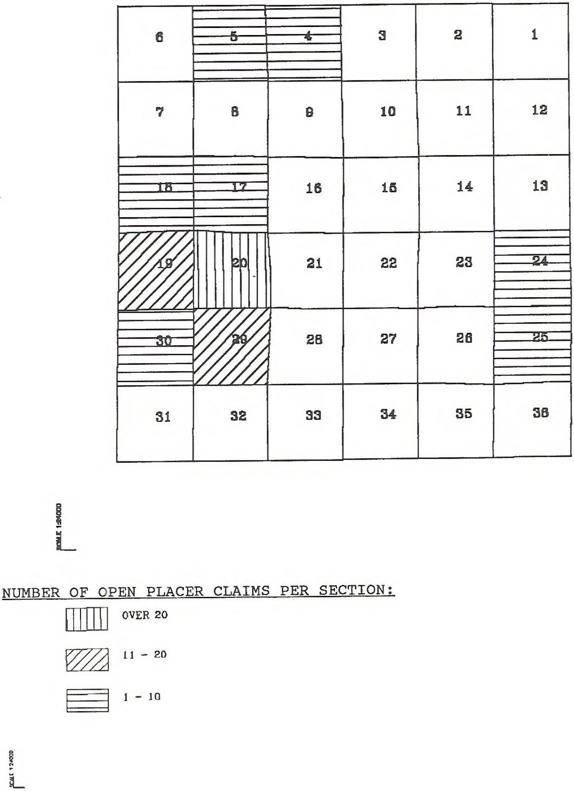


FIGURE 11. Township 29, Range 4: Open placer claims.



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